

WHAT IS CLAIMED IS:

1. An intravascular stent, comprising:
  - a plurality of metallic rings expandable in a radial direction, wherein each of the rings is aligned on a common longitudinal axis;
  - each of the rings having at least one formation therein;
  - 5 at least one flexible link formed of a polymer having a proximal end and a distal end, and a length that spans at least two rings; and
  - wherein the link has sufficient column strength to axially separate the rings, and wherein the link interconnects the rings at the formations.
2. The intravascular stent of claim 1, wherein the formation includes a structure in the ring selected from the group consisting of a hole, a notch, or a groove.
3. The intravascular stent of claim 1, wherein the formation includes a hole in the ring, and wherein the link passes through the hole.
4. The intravascular stent of claim 3, wherein the link includes spaced apart beads positioned on opposite sides of the hole in the ring.
5. The intravascular stent of claim 3, wherein the link passes through the hole and wraps around the ring.

RECORDED IN U.S. PATENT AND TRADEMARK OFFICE

6. The intravascular stent of claim 1, wherein the formation includes at least one of a notch and a groove and the link engages at least one of the notch and the groove.

7. The intravascular stent of claim 1, wherein the metallic rings include a material selected from the group consisting of stainless steel, titanium, tantalum, platinum, platinum-iridium, nickel-titanium, cobalt-chrome, and alloys thereof.

8. The intravascular stent of claim 1, wherein in the polymer material forming the link is selected from the group of polymers consisting of polyurethanes, polyetherurethanes, polyesterurethanes, silicone, thermoplastic elastomer (C-flex), polyether-amide thermoplastic elastomer (PEBAX), fluoroelastomers, fluorosilicone elastomer, styrene-butadiene rubber, butadiene-styrene rubber, polyisoprene, neoprene (polychloroprene), ethylene-propylene elastomer, chlorosulfonated polyethylene elastomer, butyl rubber, polysulfide elastomer, polyacrylate elastomer, nitrile, rubber, a family of elastomers composed of styrene, ethylene, propylene, aliphatic polycarbonate polyurethane, polymers augmented with antioxidants, polymers augmented with image enhancing materials, polymers having a proton (H<sup>+</sup>) core, polymers augmented with protons (H<sup>+</sup>), butadiene and isoprene (Kraton), polyester thermoplastic elastomer (Hytrel), high molecular weight polyethylene (HMWPE), EVAL, teflon, FEP, and polymethylmethacrylate (PMMA).

9. The intravascular stent of claim 1, wherein the link includes a bioerodable material.

10. The intravascular stent of claim 1, wherein the polymer link is extruded on to the ring at the formation.

11. The intravascular stent of claim 1, wherein the rings include a keyed formation interlocked to a complementary shaped bead formed in the link.

12. The intravascular stent of claim 1, wherein the formation of each ring includes at least one set of a plurality of grouped holes, and wherein the link is threaded through the plurality of grouped holes interconnecting the link to the ring.

13. The intravascular stent of claim 1, wherein one of an end of the link passes through the formation and folds back upon itself.

14. The intravascular stent of claim 1, wherein the link includes increased mass that engages the formation.

15. The intravascular stent of claim 1, wherein the formation includes a plurality of single holes that are uniformly spaced apart.

16. The intravascular stent of claim 1, wherein the formation includes a plurality of hole clusters that are spaced symmetrically around the ring.

17. An intravascular stent, comprising:  
a plurality of flexible cylindrical rings expandable in a radial direction, each of  
the rings having a first delivery diameter and a second implanted diameter and aligned  
on a common longitudinal axis;

5       wherein some of the rings include a metallic material;  
          wherein the rings include a formation;  
          a link formed of a polymer and having a proximal end and a distal end, wherein  
the link engages the rings at the formation; and  
          means for affixing the link to the rings.

18. The stent of claim 17, wherein the means for affixing includes wrapping  
the link around the ring at the formation.

19. The stent of claim 17, wherein the means for affixing includes stops in  
the link at opposite sides of the formation.

20. The stent of claim 17, wherein the means for affixing includes mechanically interlocking the link to the ring at the formation.

21. The stent of claim 17, wherein the means for affixing includes heating  
the link to form a first polymeric bead, threading the link through the formation, and  
heating the link to form a second polymeric bead thereby holding the ring between the  
beads.

20020000000000000000000000000000

22. The stent of claim 17, wherein the means for affixing includes bonding the link to the formation.

23. An intravascular stent, comprising:

a plurality of metallic rings expandable in a radial direction, wherein the rings are aligned on a common longitudinal axis, and each ring has an outer circumference and an inner circumference;

5 a plurality of notches disposed at the outer circumference and the inner circumference of the rings; and

a flexible link formed of a polymer, the link having a proximal end and a distal end, and having sufficient column strength to axially separate the rings, wherein the link joins adjacent rings together at the notches.

24. The stent of claim 23, wherein the link at one of the proximal and distal ends is wrapped around the outer circumferential notch and the inner circumferential notch.

25. The stent of claim 23, wherein the link is wound around the ring at the notches, and adjacent windings of the link are fused together.

26. The stent of claim 23, wherein the link and the ring at the notches are at least partially encapsulated in a polymer.

27. The stent of claim 23, wherein the link has a smaller thickness than a thickness of the ring.

28. The stent of claim 23, wherein the ring includes an exterior surface and an interior surface, and the link includes increased mass that engages the notch at one of the exterior surface and the interior surface.

29. The stent of claim 23, wherein the link is tied to the ring at the notch.

30. A method for providing an intravascular stent, comprising:  
providing a plurality of metallic rings expandable in a radial direction;  
creating a formation on each ring;  
aligning the rings along on a common longitudinal axis;  
5 providing at least one flexible link formed of a polymer having sufficient column strength to axially separate the rings, and having a length that spans at least two rings; and  
interconnecting the rings with the flexible link at the formations.

31. The method of claim 30, wherein the step of interconnecting the rings includes at least one of welding the link to the ring at the formation, wrapping the link around the ring at the formation, passing the link through the formation, bonding the link to the formation, and at least partially encapsulating the link to the ring at the 5 formation with a polymer.

TOP SECRET - 3002X

32. The method of claim 30, wherein the method further comprises:  
arranging a plurality of pre-cut rings on a mandrel;  
heating polymer pellets into a melt;  
extruding the melt; and  
guiding the melt over the rings to form the link.

5

33. The method of claim 30, wherein the method further comprises laser cutting a pattern into the stent.

34. The method of claim 32, wherein the extruded polymer link is spun onto a spool.

35. The method of claim 32, wherein the method further comprises providing a polymer extruder apparatus including a hopper for receiving biocompatible polymer pellets, providing a plasticating single screw extruder, and extruding the polymer to form the link.

36. A method for fabricating a flexible intravascular stent, comprising:  
providing a metallic tube;  
creating a formation on the tube;  
cutting the metallic tube to form a plurality of rings;  
arranging the rings on a mandrel;  
forming a polymer link by injection molding a polymer onto the plurality of rings; and

5

ABDOB939-132601

encapsulating a junction where the link contacts the formation of the rings thereby interconnecting the rings together.

37. The method of claim 36, wherein the method further comprises at least one of laser cutting, chemically etching, and laser welding the links.

TOP SECRET - 12260